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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,775	10/30/2003	Cengiz S. Ozkan	034044.025	6901

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EXAMINER	
HARRISON, MONICA D	

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 02/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/695,775	OZKAN ET AL.	
	Examiner	Art Unit	
	Monica D. Harrison	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's amendment filed 8/12/05 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 7-9, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lieber et al (6,743,408 B2) in view of Rueckes et al (6,835,591 B2)

2. Regarding claims 1, 7 and 9, Lieber et al discloses a carbon nanotube and a nanostructure (column 12, lines 25-49; Figures 8A-8D) however, Lieber does not specify that the nanostructure is connected to the nanotube covalently.

Rueckes et al discloses nanotube ribbons covalently bonded to a structure (column 13, lines 49-55).

It is obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Lieber et al with the teachings of Rueckes et al, for the purpose of covalently bonding nanotube films and articles on substrates because carbon nanotubes are substantially more robust having the highest known thermal conductivities and are not prone to thermal failure.

3. Regarding claim 2, Lieber et al discloses wherein the carbon nanotube is a single walled carbon nanotube having a length of about 20 nm to about 2000 nm (Figure 15A).

4. Regarding claim 3, Lieber et al discloses wherein the carbon nanotube is a multi-walled nanotube having a length of about 40 nm to about 4000 nm (column 11, lines 21-30).

5. Regarding claim 4, Lieber et al discloses wherein the nanostructure is a quantum dot or a quantum cluster comprising a plurality of quantum dots (column 13, lines 9-22).

6. Regarding claim 8, Lieber et al discloses one carbon nanotube having two nanostructures connected, immobilized, attached, or affixed to each end of the carbon nanotube (column 3, lines 34-37; *MWNT*).

7. Regarding claim 15, Lieber et al discloses a nanodevice which comprises the heterojunction of claim 1 (Figures 9A-9C; column 12, lines 50-67 thru column 13, lines 1-8).

8. Regarding claim 16, Lieber et al discloses at least one nanostructure selected from the group consisting of photoactive molecules, photonic molecules, inorganic ions, inorganic molecules, magnetic ions, magnetic molecules, metallic ions, metallic molecules, metallic colloids, metal oxide molecules, polymers, aptamers, haptens, radioactive molecules, fluorophores, chromophores, chemiluminescent molecules, nanowires, nanofibers, quantum dots, nucleotides, nucleic acid molecules, polynucleotides, amino acids, peptides, polypeptides, proteins, and peptide nucleic acids (column 6, lines 10-50; *metallic colloid*).

Claims 5 and 6are rejected under 35 U.S.C. 103(a) as being unpatentable over Lieber et al (6,743,408 B2) and Rueckes et al (6,835,591 B2) in view of Andriessen (6,977,390 B2).

9. Lieber et al and Rueckes et al discloses all above claimed subject matter except the quantum dot is ZnS capped CdSe, CdSe, or TiO_2 (claim 5) and the quantum dot comprising a CdSe core and a ZnS shell (claim 6).

Andriessen discloses the quantum dot is ZnS capped CdSe, CdSe, or TiO_2 and the quantum dot comprising a CdSe core and a ZnS shell (column 11, lines 64-67 thru column 12, lines 1-7).

It is obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Lieber et al and Rueckes et al, with teachings of Andriessen for the purpose of producing low voltage devices.

Claims 10, 11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lieber et al (6,743,408 B2) and Rueckes et al (6,835,591 B2) in view of (Wong et al, "Covalently-Functionalized Single-Wall Carbon Nanótube Tips for Chemical Force Microscopy").

10. Lieber et al and Rueckes et al discloses all above claimed subject matter except a method for making the heterojunction of claim 1, which comprises oxidizing the ends of the carbon nanotube, placing at least one amine group on the nanostructure, and coupling at least one end of the carbon nanotube with the nanostructure (claim 10), wherein oxidizing the ends of the carbon nanotube comprises refluxing the carbon nanotube in an acid (claim 11) and wherein coupling the end of the carbon nanotube with the nanostructure comprises adding l-elyl-3-t3-dimethylnminopropyllcrbodiimide HCL in the presence of N-hydroxysuccinimide to form a sulfosuccinimidyl intermediate that is capable of forming an amide bond with the amine group on the nanostructure (claim 14).

Wong et al discloses a method for making the heterojunction of claim 1, which comprises oxidizing the ends of the carbon nanotube, placing at least one amine group on the nanostructure, and coupling at least one end of the carbon nanotube with the nanostructure (column 2, 1st paragraph), wherein oxidizing the ends of the carbon nanotube comprises refluxing the carbon nanotube in an acid (column 2, 2nd paragraph) and wherein coupling the end of the carbon nanotube with the nanostructure comprises adding l-elyl-3-t3-dimethylnminopropyllcrbodiimide

HCL in the presence of N-hydroxysuccinimide to form a sulfosuccinimidyl intermediate that is capable of forming an amide bond with the amine group on the nanostructure (column 2, 3rd paragraph).

It is obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Lieber et al and Rueckes et al, with teachings of Wong et al for the purpose of showing the reaction of opened ends of oxidatively processed nanotubes.

Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lieber et al (6,743,408 B2), Rueckes et al (6,835,591 B2) and (Wong et al, "Covalently-Functionalized Single-Wall Carbon Nanotube Tips for Chemical Force Microscopy") in view of Andriessen (6,977,390 B2).

11. Lieber et al, Rueckes et al, and Wong et al discloses all above subject matter however, they do not disclose the nitric acid (claim 12) and wherein the nanostructure has a ZnS shell or coating and placing at least one amine group on the nanostructure comprises reacting the nanostructure with 2-aminoelrethiolhydrochloride (claim 13).

Andriessen discloses the nitric acid (column 16, line 51) and wherein the nanostructure has a ZnS shell or coating and placing at least one amine group on the nanostructure comprises reacting the nanostructure with 2-aminoelrethiolhydrochloride (column 11, lines 64-67 thru column 12, lines 1-7).

It is obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Lieber et al, Rueckes et al, and Wong et al with the teachings of Andriessen for the purpose of using the nitric acid to etch layers of ITO in order to have smooth layer for the electroluminescent layer to lie upon.

Response to Arguments

12. Applicant's arguments with respect to claims 1-17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica D. Harrison whose telephone number is 571-272-1959. The examiner can normally be reached on M-F 7:00am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Monica D. Harrison
AU 2813

mdh
February 2, 2006

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